

LIV.—On a Collection of Bats from Paraguay.

By OLDFIELD THOMAS.

THE British Museum has recently received from Mr. W. Foster a collection of bats made by him in Central Paraguay, a region of particular interest and importance to all mammalogists on account of the large number of species described by Azara from there, species many of which have been hitherto by no means satisfactorily identified. I have therefore worked out Mr. Foster's beautifully-prepared collection with unusual pleasure, and have been rewarded by finding in it authentic topotypical examples of eight of Azara's thirteen bats and also two species new to science. The latter are both members of the genus *Molossus*, a group in which Mr. Foster has been extraordinarily successful, as he has sent home examples of no less than six species of it, a very surprising proportion out of only nineteen species altogether.

I have also taken the opportunity of comparing with the Paraguayan bats the specimens sent by the late Mr. R. Perrens from Goya, on the Parana, further south in Corrientes. These, for want of Paraguayan material, I have hitherto had to treat provisionally as representing Azara's species, but I now find that in two cases at least they differ sufficiently to require separation.

1. *Vespertilio dorianus*, Dobs.

♂. Villa Rica. 16th February, 1901.

♂, 4 ♀. Sapucay. February, March, and May.
Forearms 37 to 39 millim.2. *Lasiurus borealis bonariensis*, Less. & Garn.*

♂, ♀. 24th February and 10th March.

The Red Bat was not observed by Azara, his *Chauve-souris septième*, the basis of *Vespertilio villosissimus*, Geoff., being clearly a southern representative of the Grey Bat (*Lasiurus cinereus*, P. de Beauv.).

3. *Dasypterus ega argentinus*, Thos.*Dasypterus ega argentinus*, Thos. Ann. & Mag. N. H. (7) viii. p. 247.
(1901).

♀. Sapucay. 18th March. "Caught flying."

4. *Myotis albescens*, Geoff.*Chauve-souris douzième*, Azara; the basis of *Vespertilio albescens*, Geoff.

♀. Tacuaral. 12th November, 1900.

* Cf. Allen, P. Biol. Soc. Wash. xiii. p. 165 (1900).

This specimen, like others collected at Goya by Mr. R. Perrens, has the characteristic whitening of the posterior abdomen on which the name was founded. The wings are also narrowly edged with white. The next species has the abdomen brown throughout.

5. *Myotis nigricans*, Wied.

♂, 3 ♀. Villa Rica. February.

3 ♂, 1 ♀. Sapucay. January and February.

These specimens differ from *M. albescens* by their uniformly dark bellies and other details, and are evidently specifically distinct. Rengger supposed the two forms to be identical.

MOLOSSUS.

Mr. Foster obtained no less than six species of *Molossus*, using this name in the larger sense employed by Dobson. The study of these convinces me that the dental formula in this group, however convenient as an index to determination, is emphatically not a true guide to mutual relationship. Those who wish that genera should be really genetic groups should not therefore use "*Promops*," "*Myopterus*," and *Molossus* as separate genera, unless skull-structure and not dental formula is made their basis.

To commence with: *M. Fosteri*, with the external peculiarities of *rufus*, therefore of true *Molossus* (s. s.), has four lower incisors as in *Promops* and *Myopterus*; while as regards its small upper premolar, of six specimens, three have got it, as in "*Promops*," and three have not, as in *Molossus* and *Myopterus*. The same variation occurs in *M. nasutus*.

Then it is quite evident that the broad-faced flat-headed species *cerastes*, *planirostris*, and *Temminckii* form a natural group quite apart from the others. But the last-named has a different number of lower incisors to the first two, while *maurus* (really, I think, more closely allied to "*Promops*" *abrasus* and *glaucinus*) has the dental formula of "*Myopterus*" *planirostris* and *cerastes*.

Mr. Miller is now engaged on a revision of the group, and from his use of "*Promops*" in describing new species, I presume he intends to use that as a genus. If this is the case, I shall be interested to see both how he deals with *Molossus nasutus* and *Fosteri*, and whether, if he takes *Temminckii* from the *planirostris*-group and puts *maurus* into it, he will still be prepared to maintain that his genera have, as they should have, genetic relationship as their basis.

The following is a key, by skull-characters only, to the species in Mr. Foster's collection:—

- A. Skull arched, tapering anteriorly.
- a. Two lower incisors. Upper p^1 absent.
 - a^2 . Size larger *M. rufus*.
 - b^2 . Size smaller *M. obscurus*.
 - b. Four lower incisors.
 - a^2 . Upper p^1 minute or absent. A median crest *M. Fosteri*.
 - b^2 . Upper p^1 well developed. No median crest. *M. bonariensis*.
- B. Skull flat, broad anteriorly.
- a. Size large. Four lower incisors *M. cerastes*.
 - b. Size small. Two lower incisors *M. Temminckii*.

6. *Molossus rufus*, Geoff.

Azara's *Chauve-souris sixième*, on which *Molossus castaneus*, Geoff., is based.

♂, 2 ♀. Villa Rica. 24th January, 9th and 10th April.

Azara's sixth bat, the *Chauve-souris châtaine*, has been generally considered, on account of its "fil ou ruban aigu qui se rend à la pointe du museau" and its size (spread 370 millim.), as being *M. rufus*, Geoff., or an allied local form.

This reference I am, on the whole, inclined to confirm, for Mr. Foster's specimen agrees very well with the descriptions both of Azara and Rengger, and may therefore be taken to represent *M. castaneus*. The one flaw in the description, the "blanchâtre en dessous," is equally inapplicable to any other allied species.

It is true that with the same exception the description would almost equally well fit *Molossus Fosteri*; but as it has to be allocated to one or other of the two local species, and the present one seems nearer in size, has a more perfectly "lenticulaire" antitragus, and with only two lower incisors is nearer Azara's "sans . . . incisives" than *M. Fosteri* with four, I propose to avail myself of my privilege as first reviser and to assign the name *castaneus* to the species with which I think it has most in common.

Should further material show the Paraguayan form to be distinguishable from the Brazilian, the name *castaneus* will then have to be revived for it.

7. *Molossus obscurus crassicaudatus*, Geoff.

Azara's *Chauve-souris dixième*; the basis of *Molossus crassicaudatus*, Geoff.

2 ♂, 3 ♀. Villa Rica. February and March.

♀. Paraguari. 22nd April.

These specimens are rather smaller and their skulls are markedly lighter and more delicate, with smaller brain-cases, than those of Brazilian examples, so that I provisionally use as a subspecific name the term applied by Geoffroy to

Azara's tenth bat—the “pardo acanelado” of the Spanish edition. Their forearms measure 36 to 39 millim.

But comparing with these the series obtained at Goya by Mr. Perrens, it is interesting to find that the latter are, on the contrary, the largest of all the forms assigned to the common and widely-spread “*Molossus obscurus*.” So marked is the difference, that the Corrientes form should clearly have a special name, and may be called

Molossus obscurus currentium, subsp. n.

Similar in all essential characters to *M. obscurus* as described by Dobson. Size larger than in other subspecies, and especially than in the geographically nearest *M. o. crassicaudatus*. General colour paler than usual, near but rather darker than Ridgway's “broccoli-brown.” But some examples are more rufous. Scarcely paler below. In correlation with the greater size, the cranial crests, especially the lambdoid ones, are of unusual development.

Dimensions of the type (measured in flesh):—

Forearm 42 millim. (other specimens 40, 40·5, 40·6, 41, and 42).

Head and body 78; tail 36; ear 14.

Skull: length from gnathion to occipital surface above foramen magnum 18·4; interorbital breadth 5·7; intertemporal breadth 3·6; front of canine to back of last molar 6·8.

An adult female skull measures 17·9 by 12 in greatest breadth.

Hab. Goya, Corrientes.

Type. Male. B.M. no. 98. 3. 4. 28. Collected 1st October, 1896, by Mr. R. Perrens. Eleven specimens examined.

In *M. o. crassicaudatus* the skull-length, measured as above, is about 16·5 to 17 millim., and in a series from São Paulo, representing *velox*, Temm., about 17·5 millim.

8. *Molossus Fosteri*, sp. n.

2 ♂, 4 ♀. Villa Rica and Sapucay.

Similar to *M. nasutus*, but very much smaller.

Small upper premolar minute or absent. Lower incisors four.

Size intermediate between *M. rufus* and *obscurus*. Ears rather small, rising close together at the hinder end of a distinct thread-like rim running along the muzzle from the nose, just as in *M. nasutus*; inner margin nearly straight, tip broadly rounded off, outer margin slightly convex; anti-tragus about as high as long, nearly circular, though less

exactly so than in *M. obscurus*, owing to the antero-superior edge being flattened. Tragus minute, linear. A distinct gular sac in the male.

Fur fine and silky; hairs of back about 5 to 6 millim. in length. Distribution of fur much as in *M. rufus*, but with rather more hair on the distal part of the forearm and on the proximal part of the fourth finger. General colour above dark glossy chocolate-brown, varying considerably in tone; the bases of the hairs light, but not for so great an extent as in *M. obscurus*. Under surface also brown, but without gloss.

Skull distinctly of the *M. nasutus* pattern, high, swollen, and bulbous in the brain-case and narrowed in the face. Median crest present but not high, and not running back to meet the lambdoid ridges posteriorly, there being a small triangular space on the crown quite smooth and unridged, even in the oldest specimens seen. Palate deeply arched between the teeth, as in *M. nasutus*. Chin strongly developed, projecting downward.

Upper incisors well thrown forward, more so than in *M. obscurus*. Anterior premolar, when present, exceedingly minute, smaller even than the minute outer lower incisors; altogether absent in three specimens out of six. Lower incisors four. Anterior lower premolar about half the height of the second, in the tooth-row, not crushed.

Dimensions of the type, measured in the flesh:—

Forearm 48·5 millim. (other specimens: ♂, 47·5; ♀, 47·5, 48, 48·5, 49).

Head and body 76; tail 54; spread 354.

Skull: greatest length 18·5; basal length 15; greatest breadth 11·3; interorbital breadth 6·2; intertemporal breadth 3·7; front of canine to back of m^3 6·8.

Hab. of type. Villa Rica.

Type. Male. B.M. no. 1. 8. 1. 17. Collected 26th February, 1901.

This distinct species is, with its larger ally *M. nasutus*, interesting from its annectant nature, having the general characters of the *Molossus rufus* and *obscurus* group, with a wholly different dental formula. The variation in the presence or absence of the small upper premolar is especially noticeable, three out of the six specimens having the tooth and three not; the same variation is to be observed in *M. nasutus*, in which of the two Museum specimens one has the tooth and the other has not.

9. *Molossus bonariensis*, Peters.

♀. 62. Asuncion. 16th August, 1900.

This very distinct species was obtained in some numbers by Mr. Perrens at Goya, and Mr. Graham Kerr also caught two examples at Waikthlatingmangyalwa, in the Northern Chaco.

Although larger, the skull of *M. bonariensis* has in general shape and the absence of median crests a very considerable resemblance to that of *Promops nanus*, Miller.

10. *Molossus cerastes*, sp. n.

2 ♂. Villa Rica. 22nd and 26th January.

2 ♀. Sapucay. 9th and 10th June.

General characters of *M. planirostris*, but enormously larger.

Size as large as in *M. rufus*, but the wings proportionally shorter.

Fur of medium length, not so short as in *M. planirostris*; hairs of back 3 to 3.5 millim. in length, the longer hairs over the shoulders. Fur extending on to base of forearm, on to membrane external to terminal half of forearm, and on to base of fifth finger above, and on to base of interfemoral above and below. Elsewhere the membranes and limbs are naked, except for the usual hairs on the toes. Colour uniform brown ("Prout's brown," or darker) above and below*, the hairs not or scarcely paler at their bases. Face, ears, and wing-membranes blackish. Ears short, triangular, their tips broadly rounded; keel distinct, not flattened externally; antitragus as high as long, not overlapping its base anteriorly or posteriorly; tragus triangular. A distinct gular sac present in male.

Skull remarkably broad and flat. Preorbital ridges heavily developed, so that the breadth across them is equal to that across the brain-case. Cranial crests evident, more developed than in *planirostris*, the sagittal meeting the lambdoid crests in a high helmet-like projection.

Upper incisors large, vertical, parallel, their tips not touching each other, and their bases separated from the canines. No trace of the small anterior premolar. Lower incisors four. Anterior lower premolar three-fourths the height of the second, crushed between the latter and the canine.

* The two female specimens, killed in June, are much paler and brighter than the two males. Their general tone is almost cinnamon-brown.

Dimensions of the type, measured in the flesh :—

Forearm 46 millim. (other specimens 44–46).

Head and body 90; tail 38; spread 351. First finger, metatarsus 46, first phalanx 21·5, second phalanx 19·5; fifth finger, metacarpus 27, first phalanx 13·5.

Skull: length in middle line exclusive of crests 21; basal length 18·1; zygomatic breadth 15·2; anteorbital breadth 10; intertemporal breadth 5·2; front of canine to back of m^3 8·5.

Type. Male. B.M. no. 1. 8. 1. 13.

This fine species is a giant relative of *M. planirostris*, and is particularly noticeable for the extreme flatness and breadth of the skull.

It is interesting to observe how many species of this group run in couples, the pairs distinguished *inter se* mainly by size. Thus *M. cerastes* is a larger form of *planirostris*, *rufus* of *obscurus*, *glauцинus* of *nanus*, *nasutus* of *Fosteri*, and *perotis* of *Trumbulli*.

11. *Molossus Temminckii*, Lund.

2 ♂, 4 ♀. Sapucay. January to April.

Specimens of this species obtained by Mr. Perrens at Goya are not quite similar in colour to the Paraguayan ones, but the difference appears to be due to season.

Thanks to the kindness of Dr. Winge, I have had the opportunity of comparing with the Goya and Paraguay sets typical skins from Lagoa Santa. I can find no difference of any importance between them.

12. *Artibeus lituratus*, Licht.

Chauve-souris première, Azara; the basis of *Phyllostoma lituratum**, Licht., 1823.

♂. Asuncion. 17th February.

2 ♂, 2 ♀. Sapucay. February, April, and June.

This is the common large *Artibeus* ordinarily but erroneously called *A. perspicillatus*, Linn. †

13. *Nyctinomus laticaudatus*, Geoff.

Azara's *Chauve-souris huitième*; the basis of Geoffroy's *Molossus laticaudatus* (Ann. Mus. vi. p. 156, 1805).

Nyctinomus gracilis, Wagn., of Dobson and others.

2 ♂, 4 ♀. Sapucay. 22nd May, 1901. "31 specimens were caught at one time in a hollow tree."—W. F.

* Illiger used this name in 1815 (Abh. Ak. Berl. 1811, p. 109, publ. 1815), but only as a *nomen nudum*.

† Cf. Ann. & Mag. N. H. (7) viii. p. 192 (1901).

There appears to be no doubt about this identification. Azara's statement that "la lèvre supérieure a beaucoup de rides verticales" shows that his animal was a *Nyctinomus*, not a *Molossus*, and the "autre petite oreille verticale en dessous," in the description of the ear, indicates the species commonly known as *N. gracilis*, with its high vertical anti-tragus. Size, colour, and locality all agree perfectly. The other Paraguayan *Nyctinomus*, *N. brasiliensis*, is no doubt Azara's *Chauve-souris neuvième*, which "n'a pas la seconde oreille verticale de la précédente" (cf. Ann. & Mag. N. H. (6) xx. p. 215, 1897).

14. *Hemiderma perspicillatum*, Linn.*

H. brevicauda, Wied, auctorum.

2 ♂. April and June. 4 ♀. 27th May, 1901. All from Sapucay.

15. *Glossophaga soricina*, Pall.

2 ♂. Sapucay. March and June.

From the description of both teeth and interfemoral membrane, it is clear that Rengger's *Glossophaga villosa* is not a *Glossophaga*, but its exact determination is not easy. It is perhaps a *Lonchoglossa* with the proportions of the upper incisors transposed.

One of the present specimens has an atavistic anterior upper premolar present on the left side.

16. *Vampyrops lineatus*, Geoff.

Chauve-souris seconde; the basis of *Phyllostoma lineatum*, Geoff. (Ann. Mus. xv. p. 180, 1810).

1 ♂, 5 ♀. Sapucay. March, May, and June.

These beautiful specimens are by far the most richly marked of the group that I have ever seen. Their brown colour forms a good setting for the bright and well-defined white lines of the face and back.

17. *Pygoderma bilabiatum*, Wagn.

2 ♂. Sapucay. February and March.

This peculiar bat is still but sparsely represented in collections, and these are the first properly made skins that the British Museum has received. It has not previously been recorded from Paraguay.

* Cf. Ann. & Mag. N. H. (7) viii. p. 192 (1901).

18. *Sturnira lilium*, Geoff.

Chauve-souris quatrième, Azara; the basis of *Phyllostoma lilium*, Geoff.

3 ♂, 1 ♀. Villa Rica. October 1900, and January and June 1901.

3 ♂. Sapucay. February and March.

19. *Desmodus rotundus*, Geoff.

Azara's *Chauve-souris troisième*; the basis of Geoffroy's *Phyllostoma rotundum* (Ann. Mus. xv. p. 181, 1810)*.

Desmodus rufus auctorum.

2 ♂, 4 ♀. Sapucay. 11th May, 1901. A number caught in a hollow tree.

"The most pugnacious of any bat that I have handled, extremely quick in their movements, and carry their body high when running. Fight fiercely with one another, inflicting serious wounds with their formidable teeth; some were so badly cut up about the head in their frequent quarrels that they were useless for specimens, and eventually I had to put them into separate cages. One night six *Molossus Temminckii* were put in the same cage by mistake, and by morning they were all lying on the floor of the cage nearly dead; the skin of the head was all cut away, and also a place on the back of each. This is the only kind I have met with since the month of December that have been pregnant. One female gave birth to one young on the night of May 11, 1901, and amongst them when caught was one of about a week old. Out of the thirty odd caught there were only two adult males, the rest being all females."—W. F.

In conclusion I may recapitulate the identification of Azara's bats, as thus far determined. All except those in brackets have been verified on topotypes in the Foster collection.

Chauve-souris I. *Artibeus lituratus*.

II. *Vampyrops lineatus*.

III. *Desmodus rotundus*.

IV. *Sturnira lilium*.

V. [*Noctilio leporinus*.]

VI. *Molossus rufus*.

VII. [*Lasiurus cinereus*.]

"El Orejon" of Spanish edition. [*Histiotus velatus*.]

Chauve-souris VIII. *Nyctinomus laticaudatus* (*gracilis* auctorum).

IX. [" *brasiliensis*.]

X. *Molossus obscurus crassicaudatus*.

XI. [*Myotis* sp. †.]

XII. " *albescens*.

* Cf. Ann. Mus. Genov. (2) xx. p. 547 (1900).

† The basis of *Vespertilio ruber*, Geoff. (Ann. Mus. viii. p. 204, 1806). Probably the fawn-coloured species mentioned Ann. & Mag. N. H. (6) xx. p. 214 (1897).